CLEAResult

Cannabis & Energy Nexus: Emerging Markets and Implications for Energy Efficiency

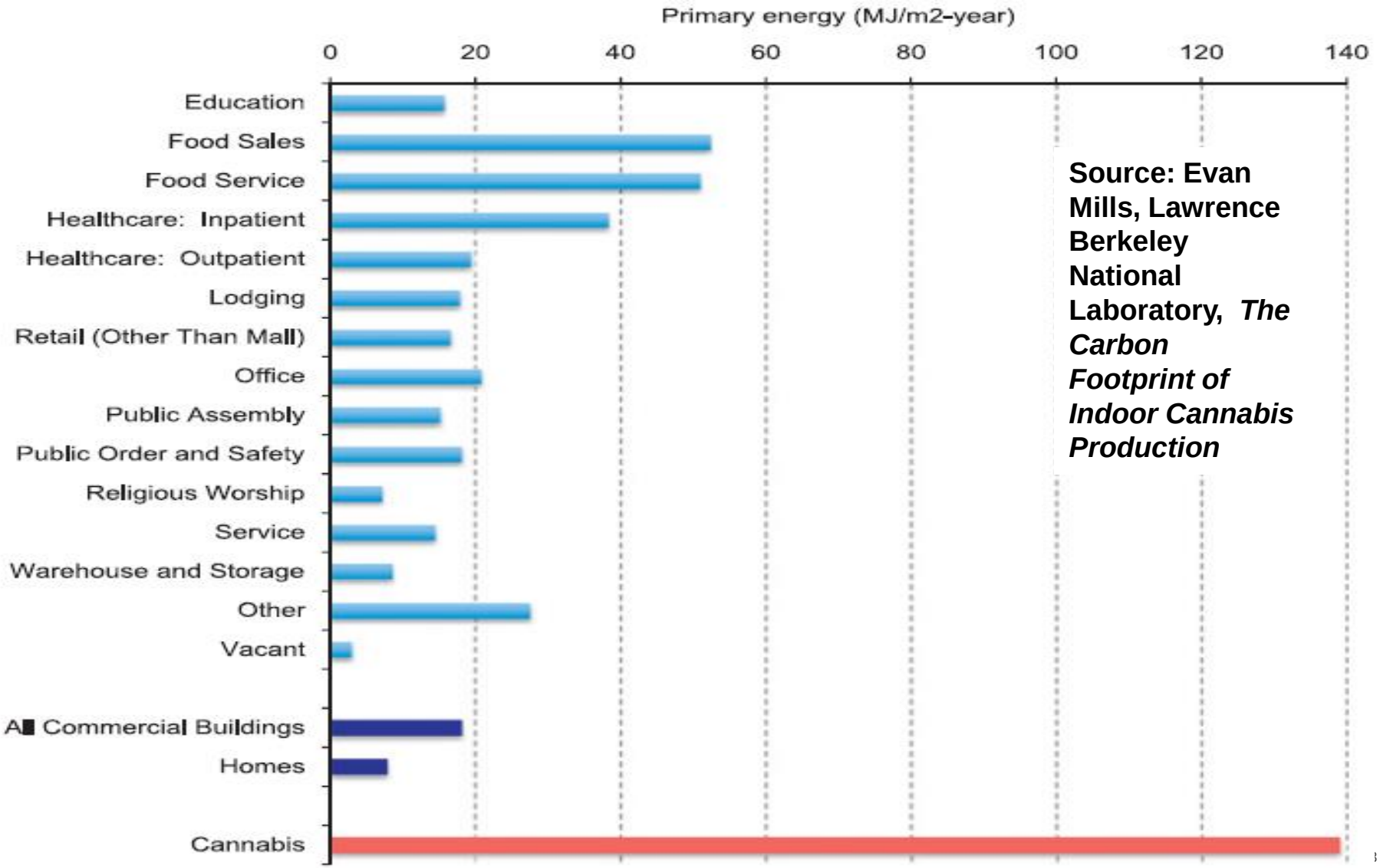
John Morris- Policy & Regulatory Affairs Director

We change the way people use energy™

- Energy Impacts of Indoor Agriculture
- Financial Impacts of Indoor Ag
- Energy Components of Indoor Ag
- Regional Program Design Considerations
- Regional Outreach

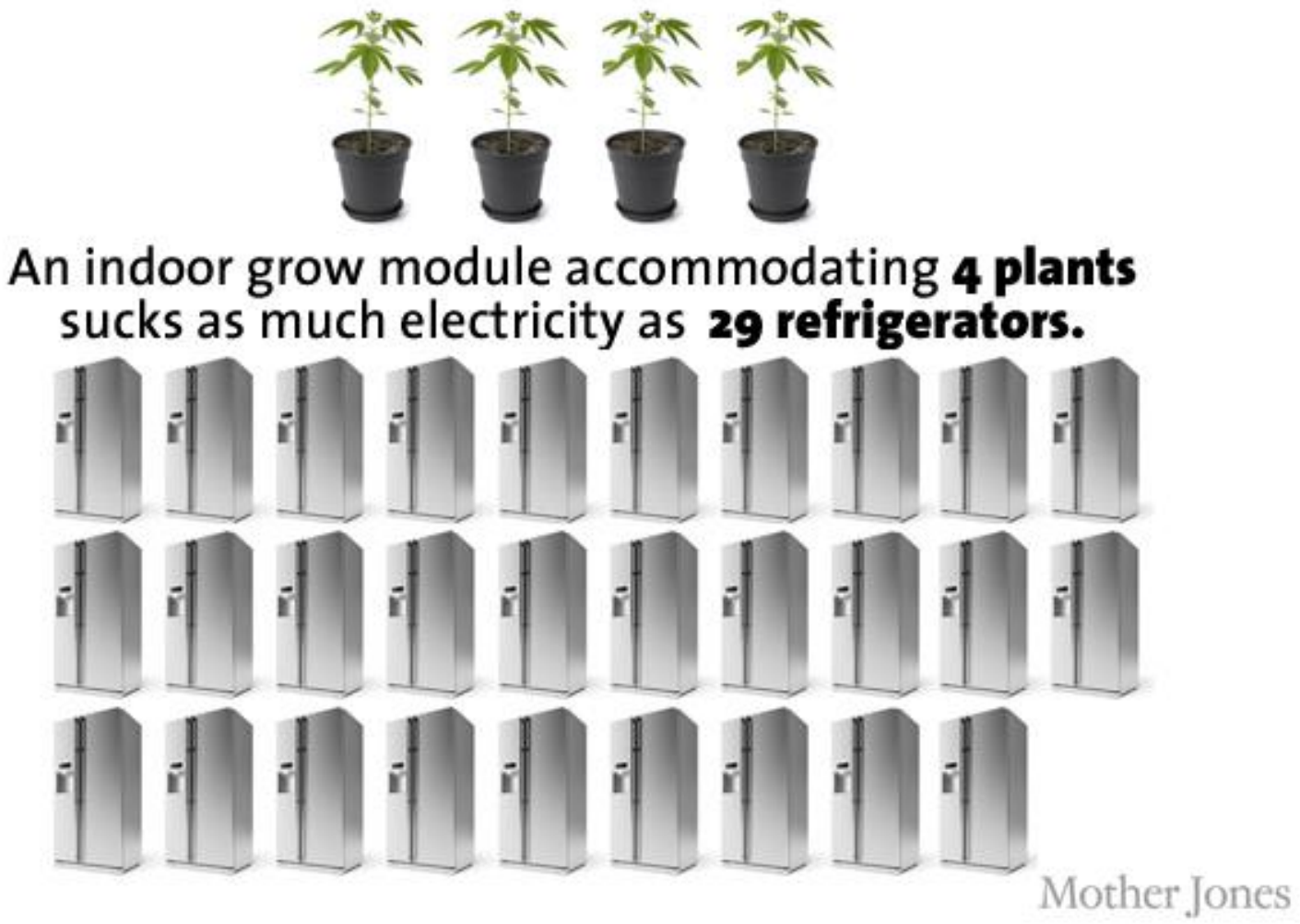
Agenda

Carbon Footprint of Indoor Cultivation



Source: Evan Mills, Lawrence Berkeley National Laboratory, *The Carbon Footprint of Indoor Cannabis Production*

Why are we talking about this- Residential Scale



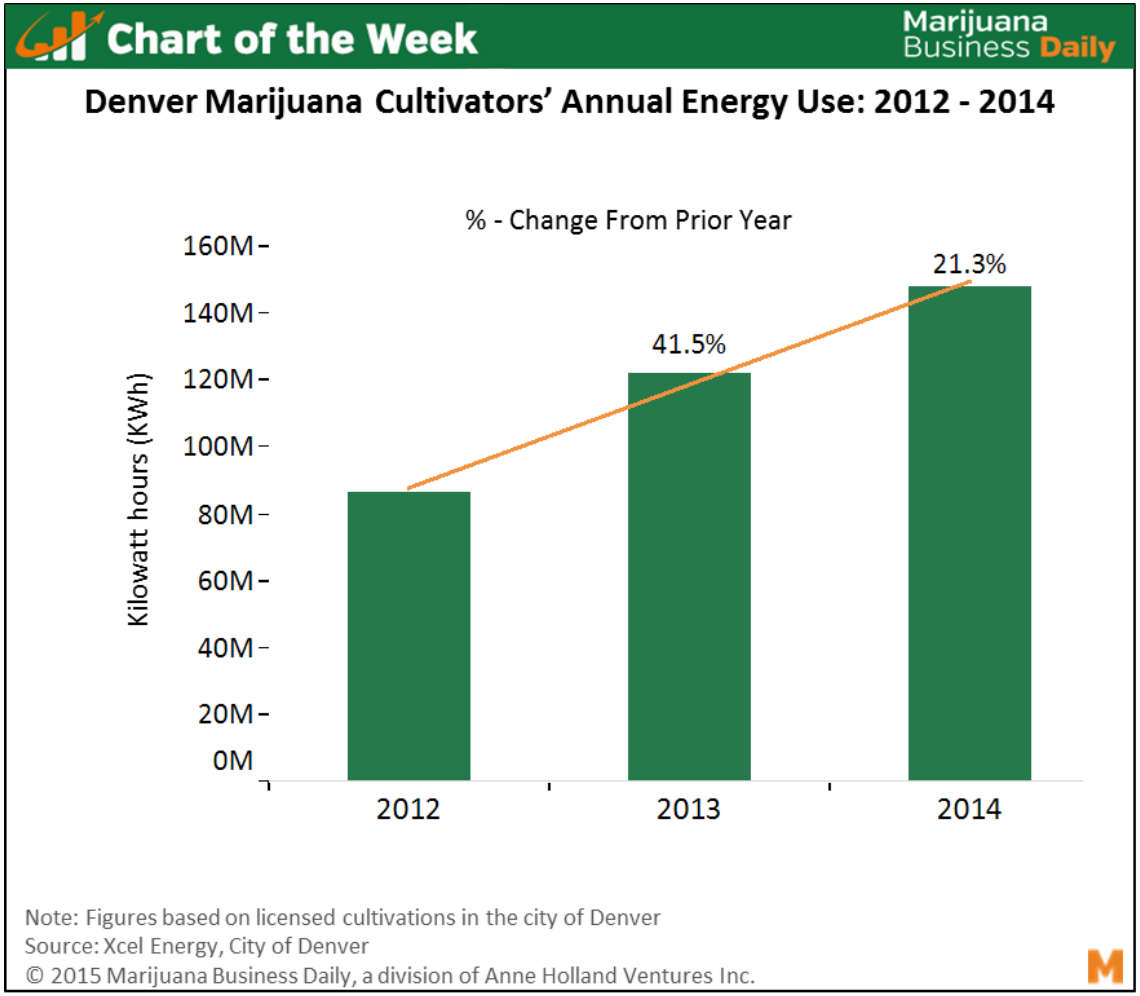
National Indoor Cannabis Production Equivalency (Annually)







Colorado Load Growth



Indoor Agriculture Operations

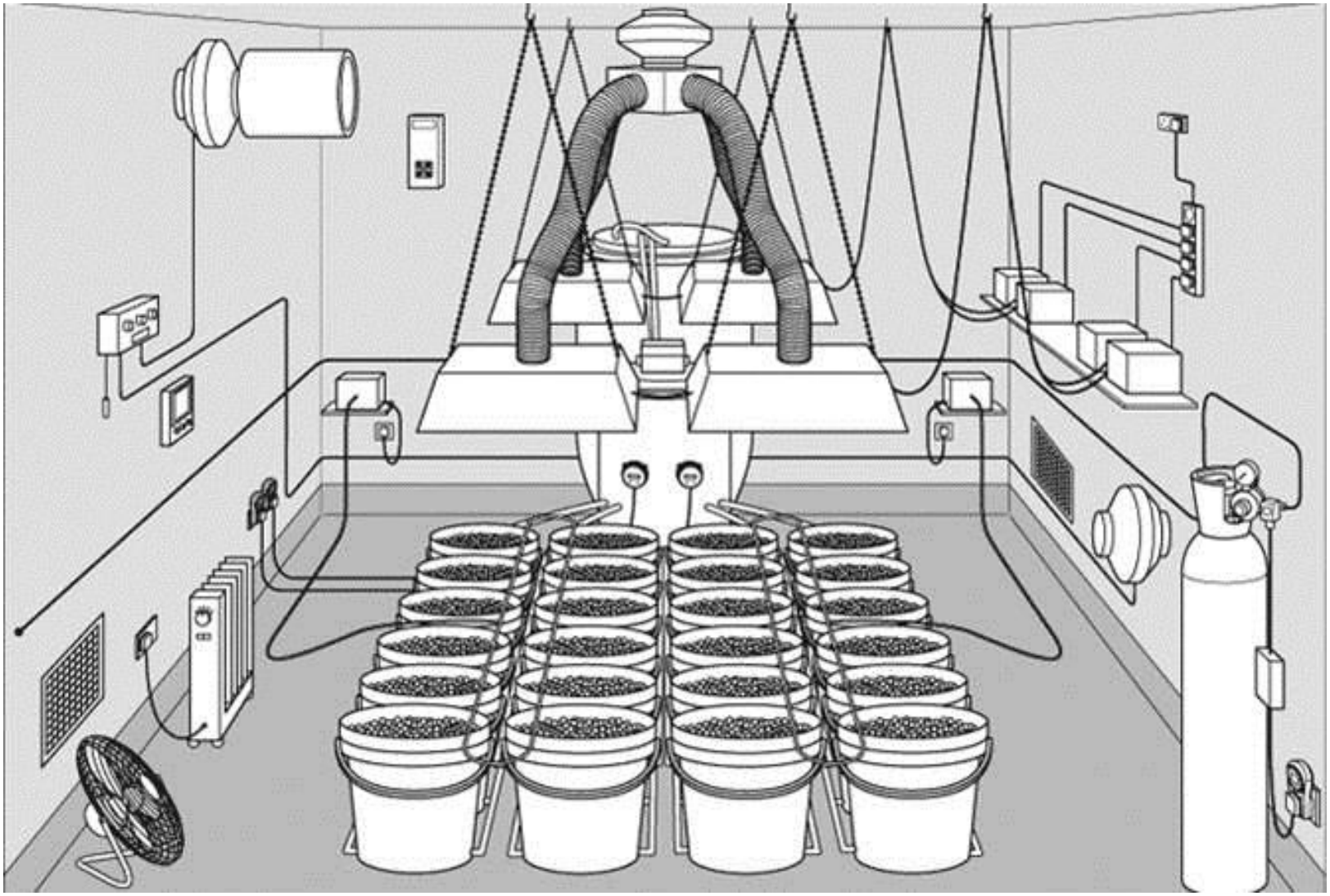
The Modern Indoor Operation

Indoor operations seek to:

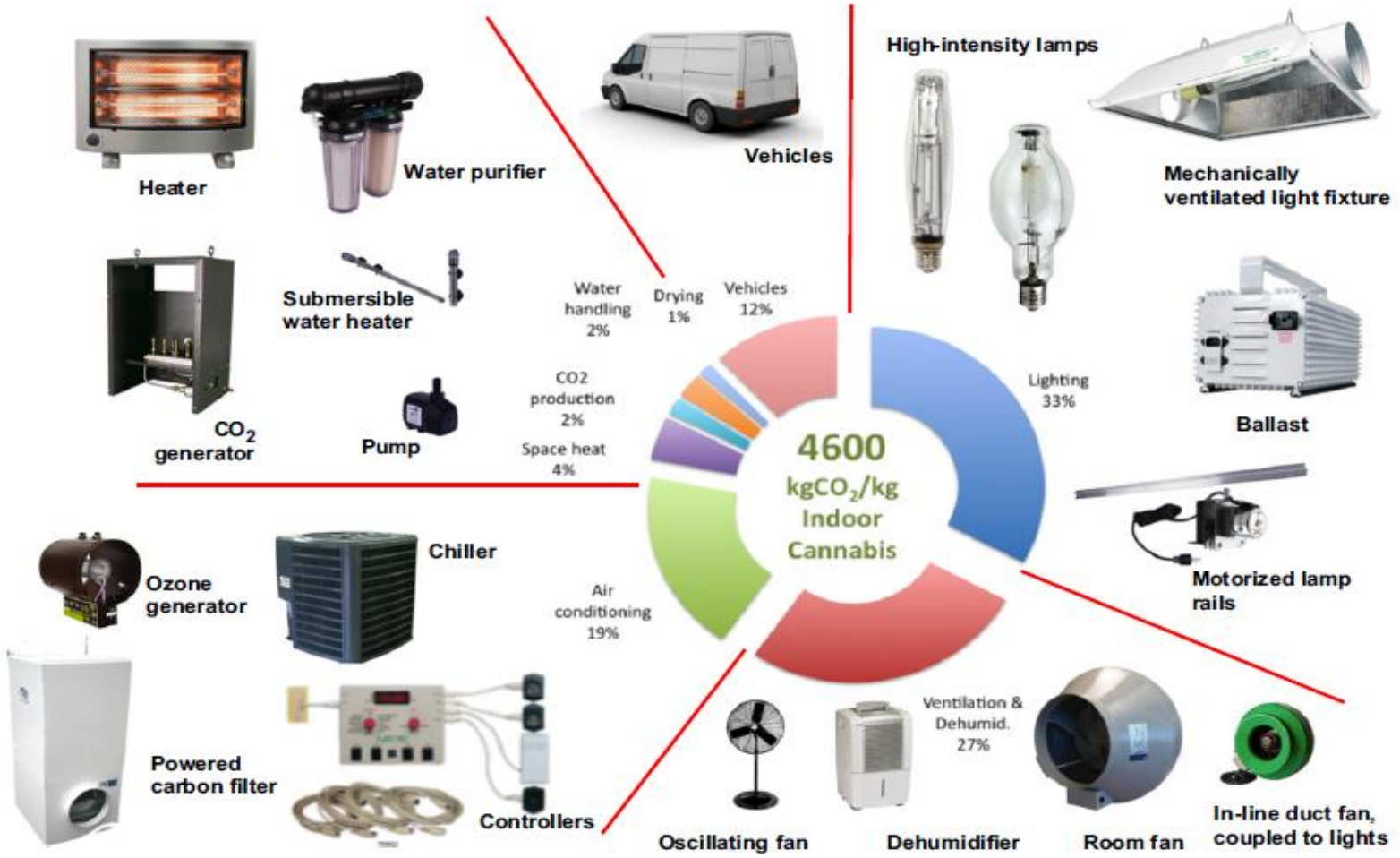
- Reduce cycle time

- Replicate ideal conditions:
  - Temperature – 55-75 degrees
  - Lighting – 1,000 watts/16-25 sq.ft
  - HVAC – 30 ACH, CO2
  - Irrigation – pumps, heating
  - Nutrients / plant food

Microcosm of an industrial system



CO2 Emissions



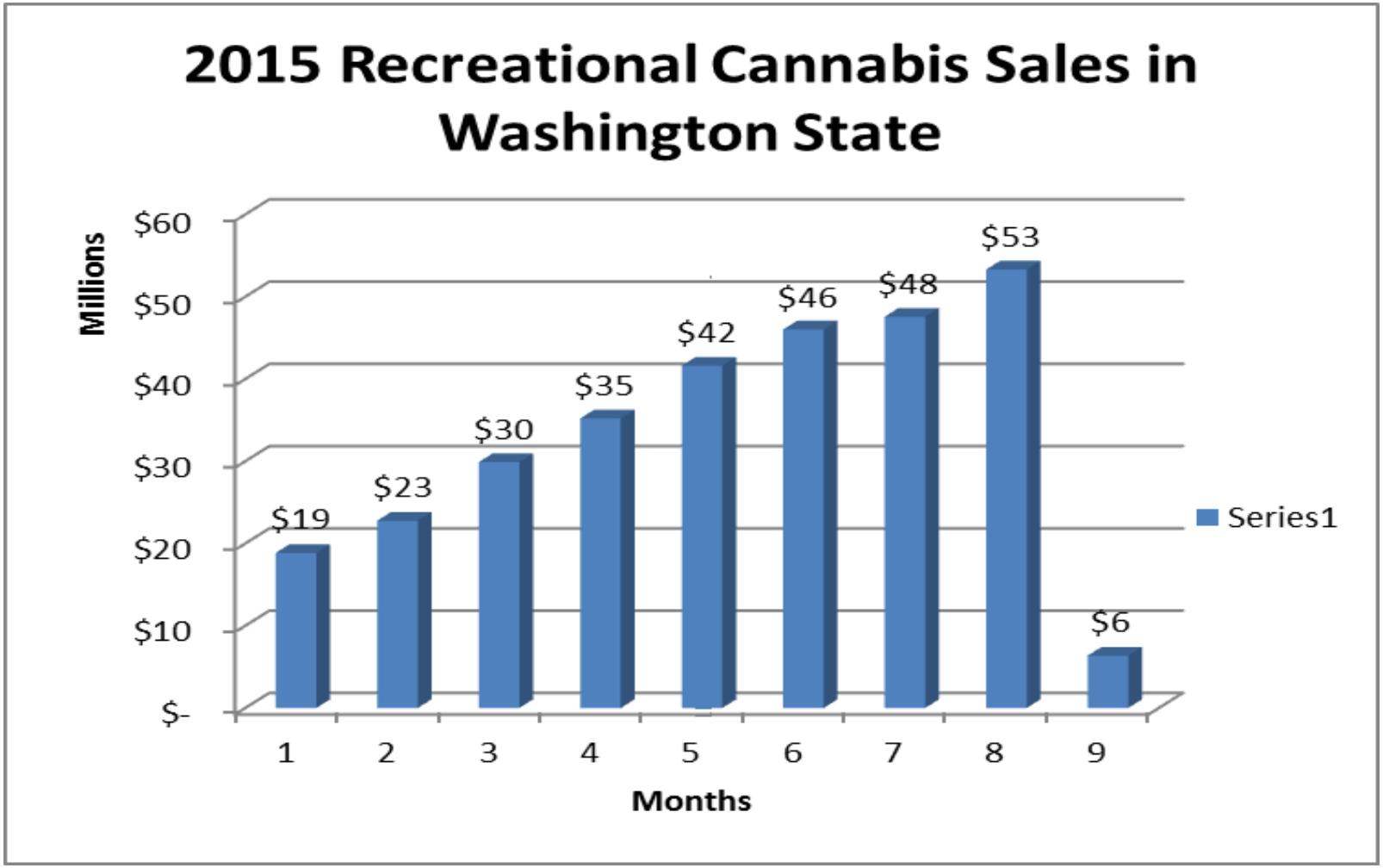
*source: *The Carbon Footprint of Indoor Cannabis production* by Evan Mills

Recent Field Assessment in Colorado

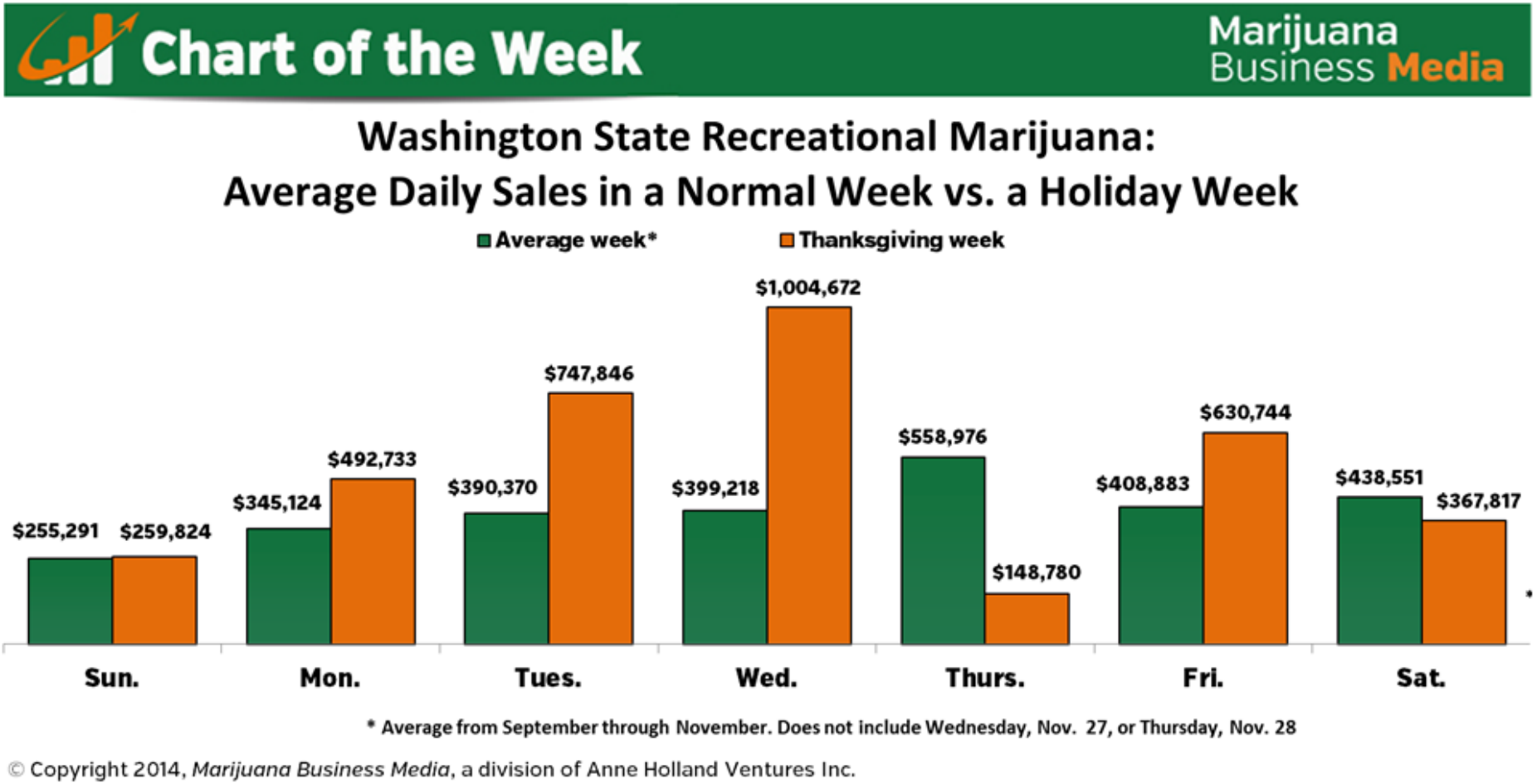
- Monthly utility cost for the three facilities are $.80/Sqft.
- New HVAC equipment with economizers for cooling and ventilation
- Approximately 216 Btu/Sqft. of cooling
- Calculated air changes per hour (ACH) 43.2
- New lighting fixtures for all phases of plant growth
- Ag pumps small and efficient
- 1000 watt High Pressure Sodium for Fruiting stage
- 1000 watt Metal Halide for Vegetative stage
- 75W T12 lamps for Incubation stage

Indoor Ag Financial Data

Washington State Sales Data- Monthly



Washington State Holiday Sales



Regional Program Design Considerations

Utility Industry Forward Thinking

Recreational Cannabis Market: Putting the Pieces Together

- Who are the main players?
- What is the potential for savings?
- How is the savings methodology approved?
- How do you proactively influence the market?
- What's the cost and reality of driving change?
- How quickly is the market moving on its own?

Defining the Market

The following entities will have an impact on the emerging business line of indoor agriculture:

1. Utilities
2. City and State government
   - Codes
   - Tax
3. Growers
4. Manufacturers & Distributors
   - Energy efficient products
5. Property Managers
   - Entities managing multiple warehouse buildings in single portfolio
   - Multi-Family in Oregon
6. Retail
7. Architects & Contractors

Utility Constraints / Impacts / Incentives

Claiming the savings:

- No baseline for indoor cannabis ag
  - Lighting currently exempt under WA state code
  - HVAC?
- Would require novel methodology – probably more than one answer
- Utilities want the savings if they can get them
- Fast moving baseline vs. lost opportunity

Developing a methodology for savings

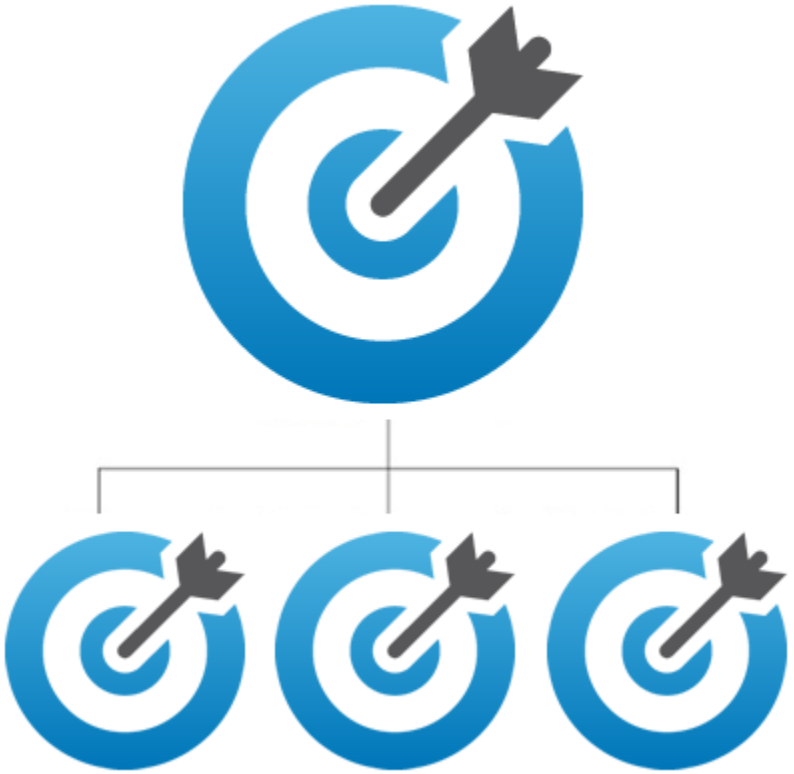
- **Code Challenges**
  - Indoor agriculture is exempt from energy code in both Washington & Oregon

- **Assume a 'Current Practice Baseline'?**
  - Only addresses lighting
  - Actual baseline could shift quickly on it's own

- **Whole building approach**
  - Commercial SEM

Grower Objectives

- Boutique industry
- Breed for yields / finish cycle
- Breed for resistance to bugs and disease
- Breed for taste and final result



Where we can help….

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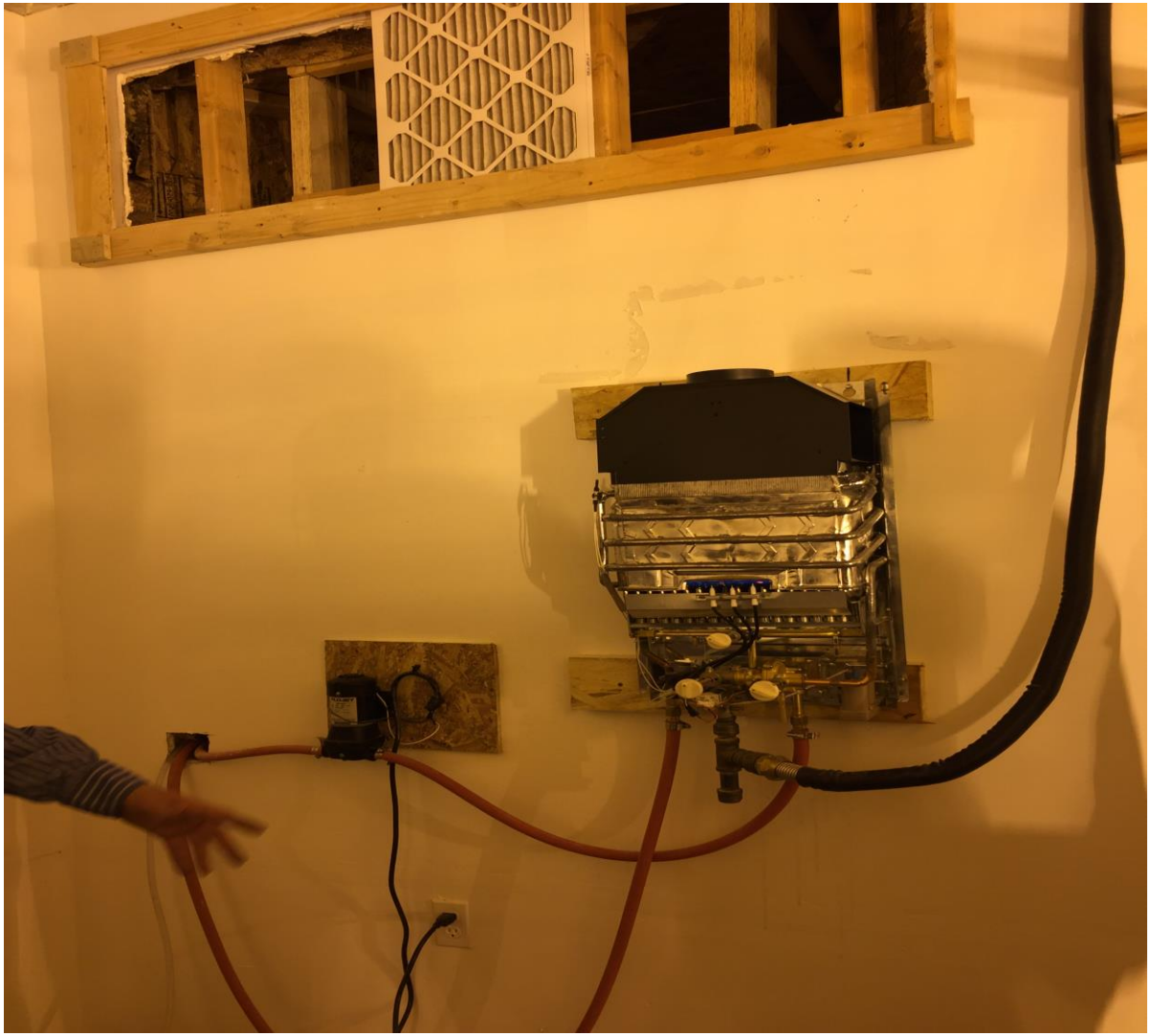

Where we can help….

Unknowns for an Emerging Industry…

- Access to banks
- Access to water
- Security
- Permitting
- Federal intervention
- Increased taxes
- **Access to energy efficiency programs**

Regional Outreach

- Ongoing conversation with NEEA
- Conduit serving as a good utility forum
- Upcoming discussions with Oregon legislators and DOE.
- Conversations with individual utilities in the region
- Dialogue with legal community in Oregon & Washington
- Dialogue with growers tomorrow